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ABSTRACT

A six week study in an urban district was conducted attempting to compare the academic interests between male and female students at the second and third grade levels, and correlate these with the students' academic performance, as put forth on the Record of Student Growth, or Report Card. The children completed teacher made interest inventories. The following week the children were asked to choose from an art, math, or reading/writing activity at the end of each class period, when World Language classes met. At the end of the five week period, all students had chosen an activity during "free time." The surveys were paired with the activity choice of each student, and at the end of the first marking period, these data were attached to each student's Report Card. All the collected data were compared with respect to gender, then grade. The results of this study lend credence to the belief that there are gender differences with respect to interest and academic performance, though these seem more apparent at the third grade level, than at the second grade level. Appendixes contain a teacher-made interest inventory, activity choices, and a Report Card. (Contains 21 references, 4 tables and 2 figures of data.) (Author/RS)

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ED 438 566

Interest Differences Between Male and Female Students and Correlation to their Academic Grades

by

Ileana F. Mena

Submitted in Partial Fulfillment of
the Requirements for the Degree of Master of Arts

Kean University
May, 2000

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Abstract

A six week study in an urban district was conducted attempting to compare the academic interests between male and female students at the second and third grade levels, and correlate these with the students' academic performance, as put forth on the Record of Student Growth, or Report Card.

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The surveys were paired with the activity choice of each student, and at the end of the first marking period, these data were attached to each student's Report Card. All the collected data were compared with respect to gender, then grade. The results of this study lend credence to the belief that there are gender differences with respect to interest and academic performance, though these seem more apparent at the third grade level, than at the second grade level.

Acknowledgments

I would like to thank Dr. Albert Mazurkiewicz, Chairperson of Communication Sciences, for his guidance, support and patience in helping me complete my study.

In addition, I would like to thank Mrs. Linda Walter, for expecting so much from me, and helping me to always strive for more. Her insights proved very valuable. I would also like to thank Miss Bodzioch, my principal, and the administrative staff for their support of this endeavor.

Dedication

I would like to dedicate this body of work to my husband for his undying faith in me, and his support of my interests, and to my children, for their love and the joy they bring to me.

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Introduction

Research findings have shown that student interests and academic grades are related. In addition, research has also found that gender is a factor in which interests are chosen by students. The purpose of this study was to determine if there are differences between male and female students with respect to their academic interests and academic grades. It was found that there exist significant differences between male and female students. It was further found that these differences are more apparent at the third grade level than at the second grade level.

Hypothesis

There will be no significant differences based on gender when students are given choices of academic activities in the second and third grades. More boys will not freely choose a mathematical activity than girls will.

Procedures

Participants in this study were 219 elementary school children (112 females and 107 males), from an urban school district in NJ. A teacher made interest inventory as related to school subjects was administered to the students in their regular classrooms. A record of student growth was used to gather data to each student's school performance.

Students were given a choice of math, reading/writing, or drawing, activities at the end of each foreign language class period (each class had two forty minute foreign language classes per week) to determine which of these activities they chose to do, and to compare and contrast with those activities cited as preferences on teacher made interest survey. Comparison of students' self-reported interests and academic grades was made. An analysis of the data was made to determine possible relationship between gender, interest, and academic performance.

Results

Chi Square tests were performed for each grade level (second grade and third grade) to determine the probability of gender and academic activity choice being related or unrelated. Table I - *Choices of Second Graders*, showed a chi-square of 13.815 was significant below the .01 level.

Table I

Second Graders

	ART	**MATH**	**READING /WRITTING**	totals
BOYS	24	27	3	54
GIRLS	44	10	4	58
totals	68	37	7	112

Highly Significant
Chi Square: 13.815

TABLE II shows a comparison of gender, academic performance and activity choice for second graders.

TABLE II

SECOND GRADE MALE STUDENTS

# of STUDENTS	CHOICE	SURVEY	REPORT CARD
2	ART	ART	MATH
3	ART	GYM	ART
1	ART	GYM	MATH
1	ART	GYM	R/LA
4	ART	MATH	ART
4	ART	MATH	MATH
1	ART	R/LA	ART
1	MATH	GYM	ART
5	MATH	GYM	MATH
2	MATH	MATH	ART
10	MATH	MATH	MATH
3	MATH	MATH	R/LA
1	MATH	R/LA	ART
2	MATH	R/LA	MATH
2	MATH	R/LA	R/LA
1	MATH	SCIENCE	MATH
1	R/LA	MATH	R/LA
4	R/LA	R/LA	MATH
1	R/LA	R/LA	R/LA

TABLE II (cont.)

SECOND GRADE FEMALE STUDENTS

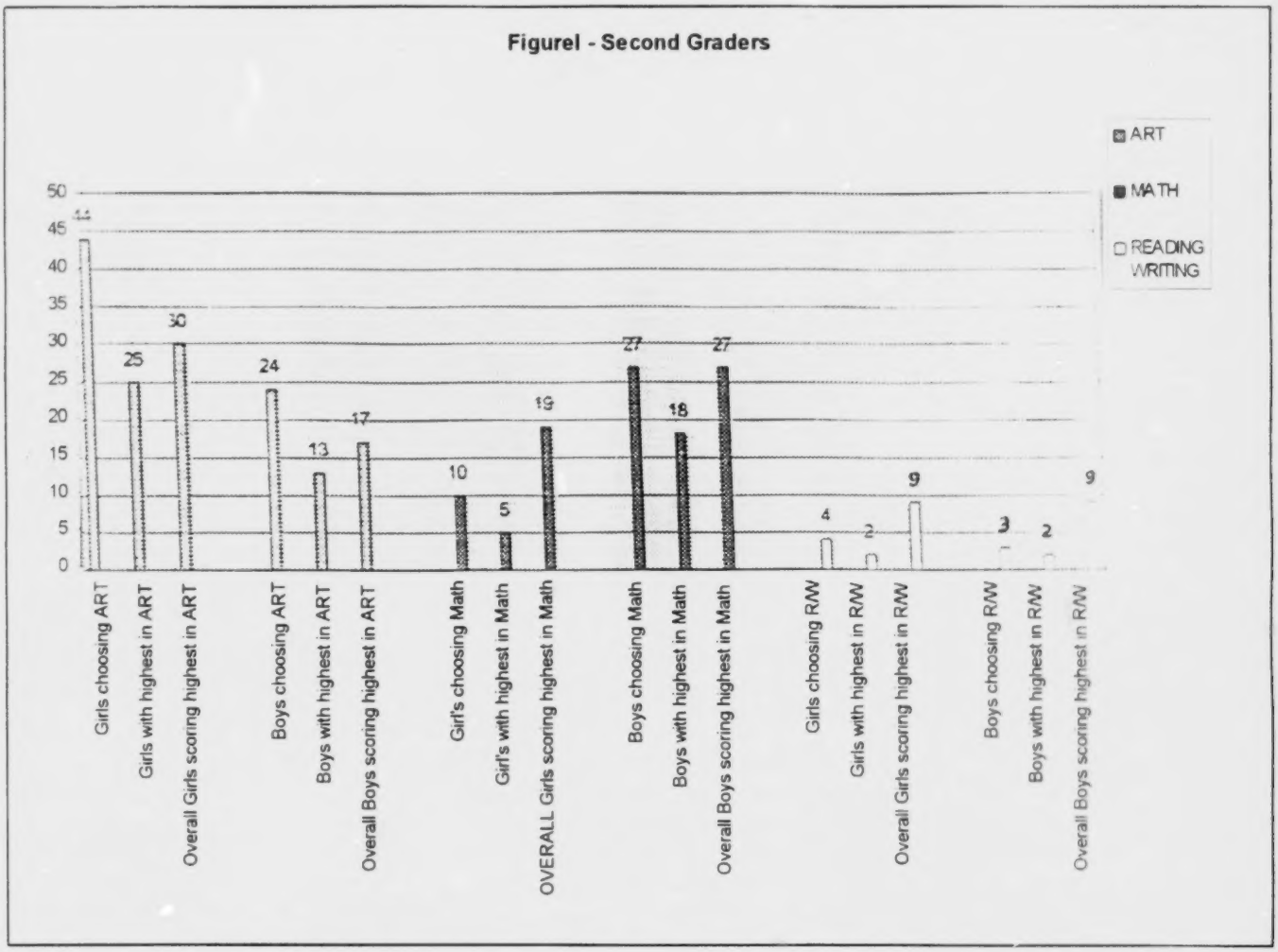
# of STUDENTS	CHOICE	SURVEY	REPORT CARD
6	ART	ART	ART
1	ART	ART	MATH
2	ART	ART	R/LA
1	ART	COMPUTERS	MATH
2	ART	GYM	ART
4	ART	GYM	MATH
1	ART	GYM	R/LA
6	ART	MATH	ART
1	ART	MATH	R/LA
1	ART	MUSIC	ART
9	ART	R/LA	ART
2	ART	R/LA	R/LA
1	MATH	GYM	ART
1	MATH	GYM	MATH
3	MATH	MATH	ART
1	MATH	MUSIC	MATH
1	MATH	R/LA	MATH
1	MATH	R/LA	R/LA
1	R/LA	ART	ART
1	R/LA	GYM	R/LA
1	R/LA	MATH	R/LA

Out of a total of 58 females, 44 chose an art activity, and 25 of those 44 received the higher grade in art. With respect to the boys, 24 out of a total of 54 chose an art activity, 13 of those 24 received the higher grade in art. For math, out of a total of 58 girls, 10 chose a math activity, and 5 of those 10 received the higher grade in math. With respect to the boys, out of a total of 54, 27 chose a math activity, 18 of those 27 received the higher grade in math. For reading/writing, out of a total of 58 females, 4 chose a reading/writing activity, 2 of those 4 received the higher grade in reading/writing and. With respect to the boys,

out of a total of 54, 3 chose a reading/writing activity, and 2 of those 3 received the higher grade in reading/writing.

For ease of visualization of data in Table II, see Figure I.

FIGURE I



These findings indicate a relationship between boys and girls as related to choice of activity as well as performance in that activity, when the activity is art.

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At the third grade level, the results indicated that 42 out of a total of 54 females chose an art activity, and 18 of the total 54 received their highest grade in art, and overall, a total of 21 of the 54 girls received the higher grade in art. Of the total of 53 boys, 26 chose an art activity and only 8 of those 26 received their highest grade in art, and overall, a total of 13 boys of the 54 received the higher grade in art .

With respect to math, out of a total of 54 girls, only 8 chose a math activity, and only 3 of those 8 received their highest grade in math, and overall, a total of 14 girls of the 54 received the higher grade in math.. Of the total of 53 boys, 23 chose a math activity and 11 of those 23 received their highest grade in math. Overall, 21 of the 53 boys received the higher grade in math.

With respect to reading/writing, of the total of 54 girls, only 4 chose a reading/writing activity, and only 1 of those 4 received the higher grade in reading/writing, and overall, a total of 16 of the 54 received the higher grade in reading/writing.. Of the total of 53 boys, only 4 chose a reading/writing activity, and only 1 of those 4, received the highest grade in reading/writing. Overall, a total of 7 of the 53 received the higher grade in reading/writing.

Table *III -Choices of Third Graders,* showed a chi-square of 10.942 with two degrees of freedom was significant below the .005 level.

Table III

Third Graders

	ART	MATH	READING /WRITTING	totals
BOYS	26	23	4	53
GIRLS	42	8	4	54
Totals	68	31	8	107

Highly significant below the .01 level
Chi Square : 10.942

Table IV shows a comparison of gender, academic performance and activity choice for third graders.

TABLE IV

THIRD GRADE MALE STUDENTS

# of STUDENTS	CHOICE	SURVEY	REPORT CARD
2	ART	ART	ART
1	ART	ART	GYM
1	ART	ART	MATH
5	ART	GYM	ART
3	ART	GYM	GYM
8	ART	GYM	MATH
1	ART	MATH	R/LA
1	ART	SPANISH	ART
1	ART	R/LA	R/LA
1	MATH	GYM	ART
4	MATH	GYM	GYM
5	MATH	GYM	MATH
3	MATH	GYM	R/LA
2	MATH	MATH	ART
1	MATH	MATH	GYM
4	MATH	MATH	MATH
1	MATH	MUSIC	MATH
1	MATH	R/LA	MATH
1	MATH	SCIENCE	MATH
1	R/LA	ART	ART
1	R/LA	GYM	GYM
1	R/LA	GYM	R/LA
1	R/LA	SPANISH	ART

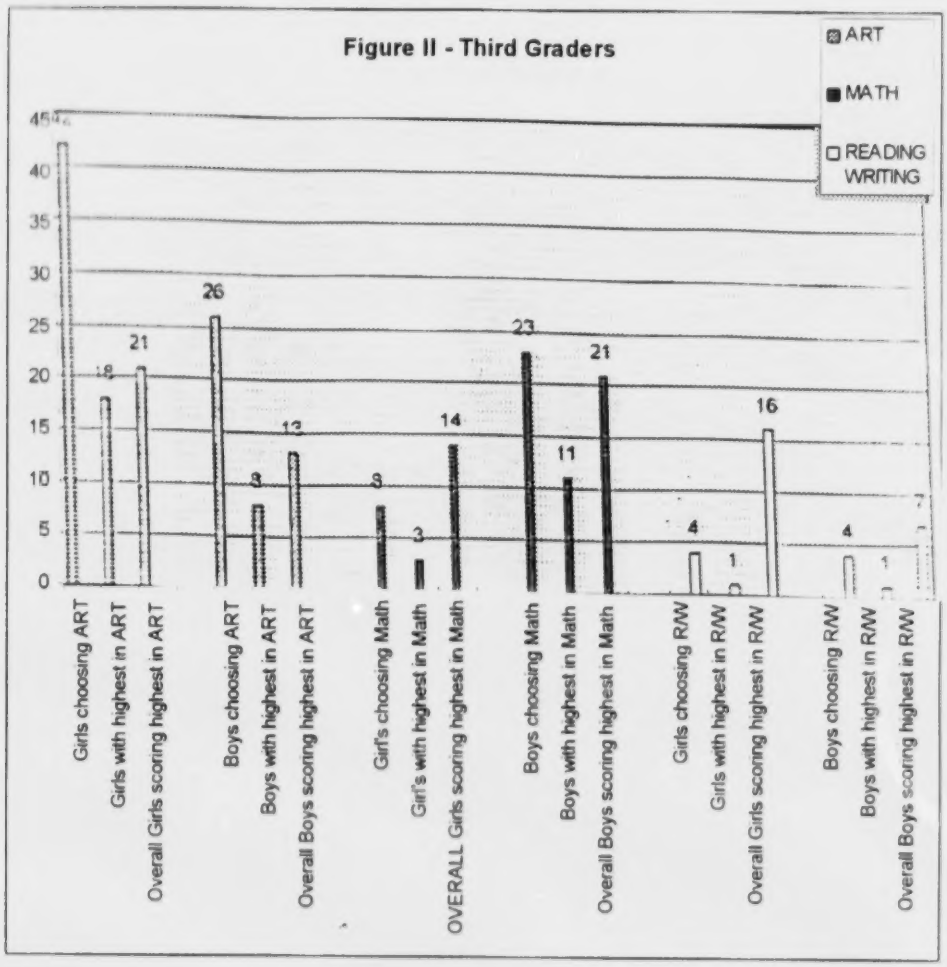
TABLE IV (cont.)

THIRD GRADE FEMALE STUDENTS

# of STUDENTS	CHOICE	SURVEY	REPORT CARD
8	ART	ART	ART
7	ART	ART	MATH
5	ART	ART	R/LA
1	ART	GYM	MATH
1	ART	GYM	R/LA
1	ART	MATH	ART
1	ART	MATH	MATH
2	ART	MATH	R/LA
3	ART	MUSIC	ART
1	ART	MUSIC	MATH
1	ART	MUSIC	R/LA
5	ART	R/LA	ART
1	ART	R/LA	MEDIA
3	ART	R/LA	R/LA
1	ART	SCIENCE	SCIENCE
1	ART	SOC. STUDIES	ART
1	MATH	ART	ART
1	MATH	GYM	MATH
1	MATH	MATH	ART
2	MATH	MATH	MATH
1	MATH	MATH	R/LA
2	MATH	R/LA	R/LA
1	R/LA	ART	R/LA
1	R/LA	GYM	ART
1	R/LA	GYM	GYM
1	R/LA	SPANISH	MATH

For ease of visualization of data in Table IV, see Figure II

FIGURE II



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Conclusions and Implications

These findings suggest a relationship between choice of activity of boys and girls and their performance in that activity, when the activity is art. The findings suggest the same results for a math activity. However, no relationship was found between boys and girls and choice of activity and academic performance, when the activity was reading/writing at the second grade level.

Michal Shemesh, 1990, in his study **Gender-Related Differences in Reasoning Skills and Learning Interests of Junior High School Students,** cites gender-related differences at the junior high school level and finds that "While the general tendency of boys during these years is toward science, math and technology, girls' tendency to learn these subjects is decreased and they tend to learn social studies and humanities." In contrast, the study at hand found that at the second grade level these tendencies are not manifested with regard to Reading/Writing. However, by the third grade, the tendencies cited by Shemesh do seem to become more apparent.

For third grade , girls showed an increase in performance as noted in Figure II within the Reading/Writing area, whereas boys showed a slight decrease.

It is suggested that more research be conducted in the field of academic interest and academic performance. It is apparent from the data gathered in this

study that interest and performance ratios change from second to third grade level, and that gender is a factor. Perhaps, if we as educators are aware of these changes in interest and performance early on, we can encourage female students more in those areas.

Review of the Literature

A study conducted by Dyanne M. Tracy, Dept. Of Curriculum , Instruction and Leadership. School of Human and Educational Services, Oakland University, Rochester, Michigan, **Toy-playing Behavior, Sex-role Orientation, Spatial Ability, and Science Achievement,** endeavored to explore the relationship between toy-playing and Science achievement in boys and girls.

This study was conducted with 282 midwestern, suburban, fifth-grade students. The study began by assuming that all children in the U.S., K-12 receive the same science curriculum. It used data from the National Assessment of Educational Progress(NAEP),1977, which stated that, on average girls 'scores on the science section were lower than boys' scores (between 1.6% and 2.5%). Other data extracted from The Second International Science Study-USA, 1983, also showed that fifth grade male-female differences was 6.2% and that for ninth grade students it was 6.5%.

Tracy cites social, educational, and personal reasons for the sex-related differences in achievement as related to science. She further cites Sherman's (1967) study which suggests that sex-typed play behavior is one of the determinants of spatial ability development This study delves into the differences among types of toys boys and girls use, and their correlation to spatial ability

development, and ultimately to science achievement. Toys were divided into six (6) categories:

Two-dimensional

stickers, jigsaw puzzles, and magnetic alphabet boards

Three-dimensional

Lego blocks, models

Estimate the Movement of an object so that it hits another Target (EMT)

Ping-Pong, Soccer, video games, billiards, volleyball, etc.

Gross-body (GB)

Ice-skates, bicycle/tricycle, canoe, skateboard, etc.

Proportional (P)

Toy tea sets, train sets, toy zoo sets, etc.

Science Activities (SA)

Telescope, Chemistry sets, rockets, etc.

It was found that as related to science achievement and spatial ability, two-dimensional toys did not engage those children with high science achievement, and in fact, they claimed to be "bored". For the three-dimensional toys , it was found that femeninely oriented boys and girls benefited from these types of toys which may be related to science achievement. However, it was found that for

androgynous children ,toy-plying habits did not seem to affect their science performance as this is above the mean. .For the EMT category, it was found that no significant differences existed. In the category of GB, it was found that students with high science achievement were not engaged nor interested in these types of toys. With respect to P, it was found that boys who reported a high level of proportional-arrangement play , the science achievement was low. For girls who reported a high level of the same type of play, science achievement was also low. Again, it was found that androgynous students may not depend on this type of play to better their science achievement. Lastly, for the SA category, it was found that no significant differences were present . In addition to the data presented, Tracy concluded that perhaps the attitudes encouraged and rewarded by teachers and parents with respect to girls, may indeed be stifling to their intellectual development.

With respect to reasoning and learning interest, Michal Shemesh, Dept. of Education in Science and Technology, Technion, Haifa, Israel, conducted a study titled **Gender-Related Differences in Reasoning Skills and Learning Interests of Junior High School Students**. This study found that the learning interests of boys do not change in junior high school while those of the girls do change , and that girls gravitate towards the humanities , the arts and social studies at this time. This study also found that with respect to cognitive levels and interests, there was a

definite correlation present. Furthermore, it found that formal reasoning is affected by learning interests in science and technology. This latter finding can be applied to boys and girls, and so in this instance only learning interest is significant. The author makes mention of the fact that " gender differences in cognitive abilities are attributed to either social-psychological factors (e.g., Harris, 198; Nash, 1975; Newcomb et.al, 1983) or psychological factors (e.g. Levy, 1974, 1980, Waber, 1977).

From a strictly technical point of view, Larry Hedges (University of Chicago) and Lynn Friedman (University of Minnesota) visited the topic of variability in intellectual ability, **Gender Differences in Variability in Intellectual Abilities: A Reanalysis of Feingold's Results.** The authors question Feingold (1992) with respect to the distribution of data in research and how this may affect results. This article notes that "gender differences in the tails are more consistent and vivid when represented by the ratio of the number of males to females in particular regions of the score distribution".

The importance of interest is addressed by Sigmund Tobias, City College, CUNY in his article titled **Interest, Prior Knowledge, and Learning.** This article explores the relationship between interest and prior knowledge. It makes a distinction between *situational interest* and *topic or individual interest. Situational interest* is defined as elicited by a situation, such as a novelty or the presence of

factors influencing the attractiveness of something. *Topic or individual interest* is defined as enduring preferences. The author cites Deci and Ryan in a study which links interest to intrinsic motivation, and further states that these are in this instance synonymous. The author also cites Appley, 1991, a study in which researches interest and motivation to cognitive processing. In addition to the above, the author also explores the existence and importance of problems with *interest-prior knowledge studies*. Some of the problems cited are a weak relationship among domain and topic knowledge, reliability of the scales used in these types of studies, method of assigning students to high/low categories, and unsuitable text passages. Interest and curiosity are also explored in this article Similarities between the two are acknowledge, but they are also distinguished clearly. The author cites Spielberger, Peters & Frain ,1981 who conduced a study on this aspect of interest and curiosity and concluded that curiosity was superior to interest because it can be related to eagerness to approach an activity, neutral reaction and disinterest, all as part of a continuous function. This article concluded that there is an established linear relationship between interest and prior knowledge. It states that interest contributes to learning because it invokes a deeper type of comprehension process and stimulates imagery among other results. In closing the article states that "...high interest and low knowledge and low interest high knowledge were likely to be transitory".

Gerard Seegers and Monique Boekaerts, Leiden University, 1996 examined several studies with regards to gender differences in mathematics in **Gender-related Differences in Self-Referenced Cognitions in relation to Mathematics.** The authors conclude that there exist, in fact, marked differences between boys and girls in the performance of mathematical tasks. In studies conducted by Ethington & Wolfe, 1984; Fennema,1984; Martin & Hoover, 1987 respectively, differences found were in favor of boys in the areas of problem solving, applications of mathematics, and mathematics reasoning. However, recently, researchers are cautioning that these differences are decreasing within the U.S. population as a result of the year of study. Kimball cites differences as only visible in standardized tests and not within tasks which are curriculum based. However, a study conducted in the Netherlands, did find marked differences between genders as related to curriculum material. In algorithmic problems, differences, however, tended to favor girls.

With respect to gender-related cognitions, the authors cite Cantor (1981) and Boekaerts (1995), they define self-referenced cognitions as *perception individuals have of themselves, including attitudes, feelings and knowledge about their abilities and skills.* They caution that these are no longer considered stable personality traits, and that students' self-referenced cognitions are more a function of context and situation, and therefore are not stable. Bandura (1982) is cited with

respect to *academic self-concept*. A distinction is made between *self-efficacy* and *self-concept of ability*. The former is used to mean how well on thinks one can perform a certain task, whereas the latter is not related to task specific situations. Furthermore, self-concept of ability is measured subjectively in comparison to peers and their performance; giving this last term a social context, Pajares & Miller 1994). Gender differences were found by Fennema and Sherman (1977,1978) with respect to self-concept, of confidence, where boys consistently scored higher than girls, even in instances where there was no difference in actual academic performance (grades 6^{th}-12^{th}).

In the area of *goal orientation*, a differentiation is made between *task orientation* and *ego orientation*. Task orientation refers to the student's concentration on a task; success at performing this task is dependent on effort. On the other hand, ego orientation is tied to a student's concept of self as related to ability. It is proposed that these two factors be explored further. Several studies propose that task orientation and ego orientation be explored with relation to learning. Nicholls ,1984 explained that in younger children success is correlated to effort, whereas, older children correlated it with ability. Finally, it is suggested that most classrooms are still ego-oriented places, which place girls at a disadvantage and increase the incidence of gender-related differences in academic performance.

The role of *attributions* is also explored in this study. It is believed that behavior is affected by views of the outcome. Weiner, 1986 developed a system of classification for attributions: *"locus of control(*internal vs. external), *stability of the attribution,* and *controllability"*. Other studies cite that students view success as a cause of internal factors, whereas, failure is viewed as being caused by external factors (Whitley and Frieze 1985 and Findley and Cooper 1983. Gender differences exist in these areas as well as the areas of academic achievement mentioned previously. In ascribing success to ability, girls were found not to do this as often as boys, but girls did ascribe failure to lack of ability, Wolleat, Pedro, Becker and Fennema 1980. These differences are most marked with relation to mathematical tasks and performance. The authors of this study, having taken all the above data into consideration, endeavored to further study the *"mechanisms underlying the observed gender differences in mathematics performance"*. This study was conducted in Leiden, Netherlands. It employed 221 students from nine schools, socioeconomic status was middle class. The students were aged 11-12 years old. Results suggest that differences in performance as related to gender are present in the more complex items. Ego orientation was found to be higher for boys than for girls. No ego orientation-attribution relationship was found. With relation to *task attraction* no significant differences were found between the genders. The results of this study concluded that there are in fact, marked

differences between boys and girls with relation to mathematics performance in the classroom, with boys being at an advantage. However, with respect to intention, the girls said they were more prepared to make an investment of time and effort of the tasks in order to succeed. In terms of orientation, girls were less ego oriented than boys. This study also concluded that girls feel lower levels of *self-efficacy* than boys do.

In **Race-Ethnicity, SES, Gender, and Language Proficiency Trends in Mathematics Achievement: An Update** by William F. Tate, University of Wisconsin-Madison, 1997, the author looks for changes, if any in the changes with respect to mathematics achievement in the U.S. Data are from the following: national trend studies, college admissions examinations and Advanced Placement tests. This study found improvement within the last 15 years, especially in basic skills. It was found that English language proficiency positively influenced mathematical outcomes, with the exception of Asian American students. The study showed a decline in differences as related to racial and ethnic , but still found that Hispanic and African American students lag behind White and Asian American students. Gender differences were present in standardized tests ,where males tended to outperform females, but this difference was not significant. At a more advanced level, however, the differences were significant, such as in Advanced Placement calculus exams. Again, as in previous studies, differences

suggest a gap between males and females as related to those tasks requiring more complex mathematical reasoning. The authors conclude that policy needs to be addressed when trying to narrow gender, racial and ethnic gaps in test performance and achievement. An important note is made with reference to the fiscal policy as it relates to urban education, and compares and contrasts the availability to supplies for suburban teachers as opposed to that of urban teachers, which could definitely be a factor in the final outcome of test scores for racially and ethnically diverse groups in urban areas. The authors cited that "more than 80% of middle to upper class-SES students received all or most of the materials or resources they requested for instructional purposes", but in contrast, only 41% of those students in low SES areas did so (ETS 1991).

Finally, the authors suggest that a reform of policy on a cultural level needs to be implemented. They argue that at the present time, in the U.S. the methods for teaching mathematics rely largely on lectures and is disjointed from the rest of the curriculum, therefore resulting in a lack of social context.

Lynn Friedman, University of Minnesota, Twin Cities, 1995 explored the relationship between spatial and mathematical skills in **The Space Factor in Mathematics: Gender Differences.** Gender differences seem to be narrowing over time (Friedman,1989; Hyde, Fennema, & Lamon, 1990) with relation to mathematics and further with relation to spatial ability, Hilton,1985; Linn &

Petersen, 1985). Mention is made of a study done in Colombia by Fillela,1960 of students in their late teens and found that "girls were more specialized than boys". With regards to teaching spatial skills, the author cites that the "non-verbal character of mathematics has been overemphasized", because although manipulatives have been in use more when teaching certain concepts the results are not improved. It is concluded then, that spatial ability is not the reason for high mathematical ability in males, although it may for females. Friedman used a set of substudies on the relationship of mathematical ability and spatial ability.

The results indicate that gender differences were present in only one respect; verbal-mathematical and spatial correlations, where females were at a disadvantage. This data refers to students in the lower grades (under high school age). For older students (high school) differences were present in two-dimensional visualization, these differences were small, however. Furthermore, the author finds that young males and females learn new tasks similarly and that for older students, the differences are not present.

Chouinard, Vezeau, Bouffard, and Jenkins (Spring 1999) **Gender Differences in the Development of Mathematics Attitudes** conducted a study of 12-18 year old Canadian boys and girls. They were looking for a correlation between gender and the development of attitudes towards mathematics. Some research exists which confirms that there is a relationship between certain

determinants such as gender and age, and attitudes towards learning. The authors used various scales to measure interest and attitudes towards mathematics. This study concluded that although girls are more likely to lack self-confidence in the field of mathematics, and experience negative feelings towards this discipline, these negative feelings disappear after age 14. Furthermore, this study demonstrated that it is boys who are primarily affected by a deterioration of mathematical attitudes.

Another study which endeavored to find gender differences in mathematical ability was carried out by Bauer and Sullivan (Spring 1998). This study concentrated specifically on high achieving elementary school students (top 5%). Data used for this research was derived from the 1996 California Achievement Test (CAT) from the state of Louisiana. This study found that there were gender differences in the types of mathematics in question. It (the study) concluded that boys outperformed girls in terms of mathematical computations. It also suggests that further research should be done on this topic.

With respect to gender and assessment, Willingham and Cole (1997) wrote a book **Gender and Fair Assessment** which explored the relationship between the two. As per Katherine Ryan's review, this book delves into "gender similarities and differences in test performance". The book focuses on these issues with emphasis on test fairness. The authors also hypothesize that gender differences in

interests may explain gender differences in learning. This book, according to K.Ryan, has crafted a new model for future study in gender and psychometrics.

O'Brien, Martinez-Pons and Kopola (1999) **Mathematics Self-Efficacy, Ethnic Identity, Gender and Career Interests Related to Mathematics and Science,** conducted a study which endeavored to correlate gender, self-efficacy, ethnic and career interests in mathematics and science. The findings of this study point to a difference in gender as related to students' career interests in science and engineering.

With respect to gender and interest, Arenz and Lee (April 1990) **Gender Differences in the Attitude, Interest and Participation of Secondary Students in Computer Use,** conducted a study to explore the differences in gender attitudes and computer use. The sample used for this study consisted of students enrolled in a metropolitan district of medium size. This study was conducted over a period of three years, and it included two other studies. The first study included 166 subjects (104 males and 62 females). The first study concluded that "the perception of computer as a male domain is high for beginning females and nonexistent for intermediate females while the same perception increased for males. The second study included a total of 328 respondents (195 males and 133 females). The results of this study showed significant differences between students who had taken a high school computer course and those who had not, but found gender related

differences only for males. It further concluded that " the difference in attitudes, interest and participation in computer use seems to be fairly consistent and predictable for both males and females". The third study consisted of 306 respondents (142 male and 164 female). No gender related differences were found in students planning to take a computer course in high school.

Susan Hinze, **Gender and the Body of Medicine or at Least Some Body Parts: (Re) Constructing the Prestige Hierarchy of Medical Specialties,** 1999, examined the effects of gender within the medical profession, as related to prestige of specialties in the medical profession hierarchy . She found that on the specialties ladder, it is masculine on top and feminine at bottom.. And while the article acknowledges that certain professions are more prestigious than others, it endeavors to find out and delineate the prestige differences within the medical profession. Hinze found that there definitely exists a "gender line" along medical specialties. She found that most often, women occupy positions in pediatrics, gynecology, dermatology, psychiatry, and family practice, while the more prestigious specialties do not count with as many females, such as: surgery and its subspecialties, anesthesiology, and radiology. Interestingly enough, the author found that traits ascribed to doctors specializing in the more prestigious specialties were masculine traits such as *macho, action-oriented, physical* and *technologically*

sophisticated, regardless of whether the physician was male or female. The author further examined the possible reasons or causes for these differences.

The data for this study were gathered through open-ended, face-to-face interviews. The initial number contacted was 405, and 308 agreed to participate in the study. The criteria were: gender, specialty and degree of engagement in the interview process. This study found that resident physicians interviewed were all in accord as to which the prestigious specialties were. They ranked surgeons at the top of the prestige ladder, with internal medicine in the next position. The least prestigious level was accorded to psychiatry. All other specialties fell between these . However, it was found that prestige and salary do not always correlate perfectly. Although all residents questioned did assign a position of higher and lower to the specialties mentioned to them, the female residents, in another part of the study were reluctant to accept that there in fact exists such a prestige hierarchy.

Hinze concludes that perhaps women choose the less prestigious medical specialties by virtue of the fact that women's value system is different than that of men.

On the topic of employment in academia, Misra, Kennelly, and Karides, 1999,**Employment Chances in the Academic Job Market in Sociology: Do Race and Gender Matter?** Explored the possible relationship between gender and employment in academia from a sociological point of view. The authors conclude

that in fact there are disadvantages as related to minority women, minority men and European-American women. Elliott (1987), asserts that "although women are just as successful as men in obtaining academic jobs, they are not equally qualified". Another source, Tomasson (1995:11), "we want to hire the best possible, but with affirmative action demands we have to process minorities and women". Although the authors found these sentiments to be the rule in academia, they found an extensive body of research to proof that in spite of affirmative action, it is still very difficult for women and minorities to secure employment in this sector as easily and as much as European-American males, Aguirre 1995; Alperson 1975; Anderson 1988, Avalos 1991, Banks 1984, Barbezat 1987, Bellas 1994, Bernard 1964, Brinson and Kottler 1993, and others. The authors also found a subcurrent in the trend. They found that women and minority men tend to obtain employment in less prestigious institutions and than white males. Segregation also exists within the fields of academia. For example, women and minority men tend to be hired in women's studies or minority studies and within these fields, women tend to occupy the less prestigious fields of humanities and education. The authors cite, that in 1992, women were best represented in education, and least represented in natural sciences where, conversely, men and Asians were most represented. It was found that while the representation of women in academia is increasing, they are still underrepresented in spite of affirmative action laws.

The data used for this study were obtained by Dan Clawson and Kathleen Holmes (Clawson and Holmes 1992; 1995). In addition, to help determine which academic institutions were more prestigious than others, the authors included data from *U.S.News & World Report's 1992 America's Best Colleges.* The authors found that contrary to popular belief women and minorities are hired more often for newly created positions, and thus debunk the myth that through affirmative action, women and minorities are displacing the white male. The study also found that " More than one -fifth of the European-American men hired were hired at associate or full professor levels. Yet, no minority men and only one minority woman were hired at such advanced levels."

Siegelman and Wahlbeck, 1999 , **Gender Proportionality in Intercollegiate Athltics: The Mathemaics of Title IX Compliance,** delved into the question addressed by Title IX, that is, provide equal participation to men and women in athletics at the college level. This study examined data from 304 Division I athletic programs and found that "most schools-especially those with football teams are nowhere near compliance." This study also found that with respect to monetary allocation, "in 1974, women's teams at one Big ten school received on $40,000 out of a total athletic budget of $6 million, and at a large southwestern university, the budget for ten varsity women's teams totaled $200." And even more disturbing and perhaps more relevant to this study, while in 1995,

50,000 men were recipients of sports scholarships, only 50 women received same type of scholarship. While Sigelman and Wahlbeck address the issue of compliance with Tile IX to the extent of its by-laws, this study puts forth valuable information about inequities between genders in yet one more forum: collegiate sports. The results of this study indicate that it is unlikely that there will, in fact be compliance with Title IX in most institutions of higher learning. It further cites that compliance is more feasible in smaller collegiate institutions because " ...schools with a smaller proportion of female students, with more financial resources for female athletic program, and *without* a football team."

McNeal, Ralph, B, **Participation in High School Extracurricular Activities: Investigating School Effects** , explored the question of advantages and disadvantages to extracurricular activities during the high school years. The author examines the effects of such involvement. The study employed the use of the High School and Beyond database which addresses extracurricular activities, but places more emphasis on athletics. The results indicate that many factors impinge on student participation. Among these factors are "general school climate, mean socioeconomic status of the student body, and percentage of students from single-parent households". The authors conclude that the climate in school is an important determinant of such student involvement. This study further explores the benefits to be gained from such extracurricular involvement, such as

educational, social and personal rewards. It cites, however, that " While many studies generally find positive outcomes associated with student involvement, others find that such effects significantly vary across activities", (e.g. Coleman, 1965, Cusick, 1973; Eder and Parker, 1987; McNeal, 1995).

And it goes further to cite that, " outcomes associated with extracurricular participation are occasionally negative, such as increased peer isolation and the perpetuation of gender biases", (Connell et.al., Kessler et al., 1985). The author found that extracurricular activities are indeed the source of what he terms " human capital", which he defines as : skills, years of schooling and levels of achievement Another type of capital derived from such involvement is " cultural capital", which he defines as : specific attitudes and values, and access to art and literature, and lastly, the "social capital", defined by the author as : social relationships and networks. It is important to note that the authors found athletics to be the most prestigious of the extracurricular activities, yet the previous study examined (Sigelaman and Wahlbeck) found disproportionate allocation of females and funds available to this endeavor. These findings suggest that although home environment and other intangibles have an effect in the degree of student involvement, it is the school climate that bears the most weight. It is, therefore imperative that schools encourage females, in their "climate" as much as males to participate in these activities and mostly in sports, as it is in this sector where the

most prestige is found, yet where there are the least number of females, and noted in the study by Sigelman and Wahlbeck. The authors conclude that " This research clearly indicates that an arena in which students gain substantial benefits by assessing social and cultural capital (i.e., school extracurricular activities."

Joyce, Beverly, A., **Informal Science Experience, Attitudes, Future Interest in Science, and Gender of High-Ability Students: An Exploratory Study,** examined the relationship, if any of young students' science experiences and choice of career. The study examined findings from a study by Anne Roe (1952), National Science Board, 1993 and data from the *National Science Education Standards.* Roe's goal was to identify the "elements in the making of a scientist". The authors caution against generalizations, as there do exist many factors and variables, but they do indicate that research exists to corroborate the link between early experiences and career development. It is important to note that the relationship of gender roles, when they form and vocational choices are important factors to consider when exploring this topic Bem (1981), Eccles (1985), Fox (and Cohn (1980), Hollinger (1991), and Nash (1979). Their research has indicated that " certain childhood experiences have an influence on the formation of future personality traits." Eccles (1984) found that course-taking is affected by environmental influences and specifically as related to mathematics and science. This study (Farenga & Joyce 1999) was conducted with 111 high ability students,

56 males and 54 females, between the ages of 9 and 13. The criteria for high ability was defined by IQ scores over 130 and scoring in the 90th percentile or higher in Total Reading and Total Mathematics on the Stanford Achievement Test. The instruments used were the Test of Science-Related Attitudes (TOSRA) (Fraser,1981). The Science Experiences Survey (SES) by Mason and Kahle (1988). The results indicated that gender differences do exist between high ability girls and boys in terms of which type of science each preferred. the girls favored life sciences, while the boys favored physical sciences. Correlation was established between informal science experiences and course chose by both genders. Roe's findings were corroborated by findings of this study and also suggested that by age 9, attitudes toward science are established, as either appropriate or inappropriate. Finally, the authors suggest that parents and educators need to encourage and foster more positive attitudes towards science. Another gender study with respect to Science Achievement was conducted by Dimitrov, Dimiter, M., 1999, **Gender Differences in Science Achievement: Differential Effect of Ability, Response Format, and Strands of Learning Outcomes.** The author reviewed the literature with regards to science achievement and found that in fact there is a body of literature which supports the view that boys do favor science more than girls and that 5th graders "had significantly more positive attitudes towards science than did 7th and 10th graders. Although many

factors are responsible for girls' lack of science experience, experience outside of the classroom was cited as a major factor (Kahle & Lakes, 1983). Also noted were the gender biases of teachers and cultural and societal factors. Ethnicity and science ability needs to be further researched in order to determine what the implications of these are. This study, therefore , delved into the questions of science achievement and ethnicity as well. The subjects of this study were 2,551 fifth grade students in northeast Ohio. Ethnicity information was as follows: 38% Caucasian , 48% African-American, and 14 % Hispanic. Data were gathered from the Ohio off-Grade Proficiency Test-Science (Riverside Publishing, 1995). The results of this study indicated that there were significant gender differences, but not between gender and ethnicity. No gender differences were found within the low and medium levels, but were found in the high ability level. Therefore, the authors concluded that gender differences at the fifth grade level did not depend on ethnicity. Boys performed better than the girls at the high ability level, but no differences were found within the low and medium groups. The implications of this study, again point to the need for educators to be abreast of the research and be aware that attitudes are developed early in both genders with respect to science.

In **Gender Style as Form and Content: An Examination of Gender Stereotypes in the Subject Preference of Children's Drawing,** Donna M. Tuman, 1999, the question of gender and art is addressed. Again, finding that

there indeed exist differences. The subjects of this study were 300 students; 65 students in grade 1, 57 students in grade 2, 59 students in grade 3, 65 students in grade 4, and 54 students in grade five. This students were from a school in Glen Head, New York. The students were mostly white, middle and upper-middle class and there were less than 20% minority population. Gender differences were found in the style and content areas. Girls' drawing were based on realism, while boys' were based on fantasy. Sports were favored by boys and girls favored , and more "action" was present in boys' drawing than in girls'. The authors found that both genders differed in styles and that with respect to stereotypical behaviors, neither gender " transcended stereotypical behaviors." The male-based domains were, among others, sports ,danger, violence and heroism. For girls, the female-domains were, among others, domestic life, realism, animals, physical and social appearances. The results of this study indicate that gender styles are learned and developed rather early and again, that educators need to be aware of this occurrence to better guide the students . Educators need to be able to challenge both genders and stimulate each outside of the stereotypes.

Delores Lowe Friedman, **Science, YES! Constructing a Love for Teaching Science,** 1999, explored the different ways in which students can be stimulated into continued interest in science, particularly girls. The study acknowledges that the body of literature now available attests to the fact that " girls in particular lose

their enthusiasm for science as they continue in school." The American Association of University Women's report *How Schools Shortchange Girls (1992,2)* found that our current educational system does not meet the needs of girls, as related to curriculum, teacher interaction and school climate. The lack of role models for girls in science is also addressed, as almost all teacher are women, and they offer their own biases towards this discipline as well. This study concluded that the teachers who were its participants did indeed develop an interest in science after having been empowered by a good curriculum, and overcoming their fear of science. In addition, it was concluded that most teachers feel fear of administrators as it pertains to effecting change in the classroom themselves. This study found evidence that a constructivist classroom works, and works better, especially in science where experimentation is important. But, finally, this study concluded that if change in the field of science is to happen , programs need to be ongoing in all districts and be supported by administrators, not once a year institutes. It seems clear from all the body of literature reviewed in this study, that gender differences exist in education and that these differences when not properly addressed can and do influence the quality of education each gender receives.

References

Chouinard, Roch, Vezeau, Carole, Bouffard, Therese and Jenkins, Brenda, **Gender Differences in the Development of Mathematics Attitudes,** Journal of Research and Development in Education-Volume 32, Number 3, Spring 1999.

Friedman, Lynn, **The Space Factor in Mathematics: Gender Differences,** Review of Educational Research, Spring 1995, Vol.65, No.1,pp22-50

Tate, William, F., **Race-Ethnicity, SES, Gender, and Language Proficiency Trends in Mathematics Achievement; An Update,** Journal for Research in Mathematics Education, 1997, Vol.28, No.6, 652-679.

Tobias, Sigmund, **Interest, Prior Knowledge, and Learning,** Review of Educational Research, Spring 1994, Vol.64, No.1, pp.37-54.

Feingold, Alan, **Joint Effects of Gender Differences in Central Tendency and Gender Differences in Variability** , Review of Educational Research, Spring 1993, vol. 63, No.1, pp.106-109.

Hedges, Larry, Friedman, Lynn, **Gender Differences in Variability in Intellectual Abilities: A Reanalysis of Feingold's Results,** Review f Educational Research, Spring 1993, Vol. 63, No. 1, pp. 94-105.

Arenz, Bernard, W., Lee, Miheon, J., **Gender Differences in the Attitude, Interest and Participation of Secondary Students in Computer Use,** American Educational Research Association (AERA), Boston, April, 1990.

Willingham, Warren, S., Cole, Nancy, S., **Gender and Fair Assessment,** Lawrence Erlbaum Associates, 1997.

O'Brien, Virginia, Martinez-Pons, Kopala, Mary, **Mathematics Self-Eficacy, Ethnic Identity, Gender, and Career Interests Related to Mathematics and Science,** The Journal of Educational Research, March/April 1999 {Vol.92 (no.4)}.

Park, Hae-Seong, Bauer, Scott, Sullivan, Lisa Melancon, **Gender Differences Among Top Performing Elementary School Students in Mathematical Ability,** Journal of Research and Development in Education- Volume 31, Number 3, Spring 1998.

Seegers, Gerard, Boekaerts, Monique, **Gender-Related Differences in Self-Referenced Cognitions in Relation to Mathematics,** Journal for Research in Mathematics Education, 1996, Vol.27, No.2 215-240.

Hinze, Susan W, **Gender and the Body of Medicine or at Least Some Body Parts: (Re)Constructing the Prestige Hierarchy of Medical Specialties,** The Sociological Quarterly, Volume 40,Number 2, pages 217-239.

Misra ,Joya, Kennely, Ivy, Karides, Marina, **Emloyment Chances in the Academic Job Market in Sociology: Do Race and Gender Matter?,** Sociological Perspectives, 1999, Vol.42, No.2, pp.215-247.

Sigelman, Lee, Wahlbeck, **Gender Proportionality in Intercollegiate Ahletics: The Mathematics of Title IX Compliance,** Social Science Quarterly, Volume 80,Number 3, September 1999.

McNeal, Ralph,Jr.,**Participation in High School Extracurricular Activities: Investigating School Effects,** Social Science Quarterly,Vol.80,No.2,June 1999.

Joyce, Beverly, A., Farenga, Stephen, J., **Informal Science Experience, Attitudes, Future Interest in Science, and Gender of High-Ability Students:**

An Exploratory Study, School Science and Mathematics, Volume 99 (8), December 1999.

Dimitrov, Dimiter, M.,**Gender Differences in Science Achievement: Differential Effect of Ability, Response Format, and Strands of Learning Outcomes,** School Science and Mathematics, Volume 99 (8), December 1999.

Shelly, Robert, K, Munroe, Paul, T., **Do Women Engage in Less Talk Behavior than Men?,** Sociological Perspectives, Vol. 42, No.1, pp.49-67, 1999.

Tuman, Donna, M., **Gender Style as Form and Content: An examination of Gender Streotypes in the Subject Preference of Children's Drawing,** Studies in Art Foundation,, A Journal of Issues and Research ,1999, 41 (1), 40-60.

Cowger, Ernest, L.,PhD, Brickman, Paula,J.,PhD, Miller, Mark, J.,PhD, Springer, ThomasP., PhD.,**Accuracy of the Leisure Activities Finder Among High School Students,** College Student Journal, 1999.

Friedman, Delores, L.,**Science, YES! Constructing a Love for Teaching Science,**The Clearinghouse, May/June 1999.

Appendices:

NAME: _____HOMESTATION___

I like to write letters and stories. YES NO

I like to work with computers. YES NO

My favorite class in school is _____

It is my favorite class because _____

_____

I like to do number problems. YES NO

Math word problems are fun! YES NO

I like to draw and paint. YES NO

I like to sing. YES NO

I like to play a musical instrument. YES NO

Gym class is lots of fun! YES NO

Science is my favorite class! YES NO

MATH

1846

Please add or subtract according to directions.

Add:

11 + 2=

2-0=

20 + 12=

21+2=

11-6=

READING/WRITING

Please read the following story:

The dog was barking very loudly as the train went by. George was outside and heard all the noise, but was not aware that his dog was scared. Then, he saw him shivering and ran to cuddle him.
His dog was so happy!

Was the dog happy? Yes no

Was there a train going by, or a plane?

49

ART

Please draw your favorite food, and label it with its name.

VICTOR MRAVLAG GIFTED & TALENTED SCHOOL #21
RECORD OF STUDENT GROWTH
1999 - 2000

Student: **Grade:** **Component:**

Homestation Teachers: **Principal:** Miss Jane Bodzioch

MARKING PERIOD 2nd February, 2000

SOCIAL DEVELOPMENT		COMMENTS
Is Courteous		
Practices self-control		
Respects rights & property of others		
Responds favorably to suggestions		
Practices good health habits		

READING		COMMENTS
Classwork		
Homework		
Mastery of Reading Skills		
Reading Level		
Language Arts		
Spelling		
Penmanship		

MATH		COMMENTS
Classwork		
Homework		
Mastery of Skills		

SOCIAL STUDIES		COMMENTS
Classwork		
Homework		
Mastery of Skills		

SCIENCE		COMMENTS
Mastery of skills		

MEDIA		COMMENTS
Mastery of skills		

GENERAL ART		COMMENTS
Interest and effort		
Mastery of skills		

MUSIC		COMMENTS
Vocal		
Piano		
Instrumental		

PHYSICAL EDUCATION		COMMENTS
Interest and effort		
Mastery of skills		

HEALTH		COMMENTS
Interest and effort		
Mastery of skills		

MINI-STUDY	
Title:	
Teacher:	
Interest and effort	
Mastery of skills	

WORLD LANGUAGE - SPANISH	2nd
Expresses ideas at level of proficiency	
Reflects on cultural patterns	
Level of Communicative Proficiency - * one	
Novice Learner - *one or two word response*	
Intermediate Learner - *simple sentences*	
Pre-Advanced Learner - *more complex sentences*	
ENGLISH AS A SECOND LANGUAGE	

BEST COPY AVAILABLE

KEY TO GRADING	
5 - Excellent	95-100
4 - Very Good	90-94
3 - Good	80-89
2 - Average	70-79
1 - Below Average	60-69
U - Unsatisfactory	Below 60
N.A. - Not Applicable	

KEY TO READING LEVEL
A - Above grade level
B - On grade level
C - Below grade level

KEY TO SOCIAL DEVELOPMENT, HOMEWORK PENMANSHIP MINI-STUDIES
S - Satisfactory
N.I. - Needs Improvement

ATTENDANCE	Nov.	Dec.	Jan.
Days Absent			
Days Tardy			